THURSDAY, AUGUST 21, 1873

THE REPORT OF THE SCIENCE COMMISSION ON THE OLD UNIVERSITIES

I.

ONE of the two Royal Commissions appointed to inquire into University matters has just issued its Report, and it comes in the very nick of time; for while on the one hand the question of University reform is day by day attracting a larger share of public attention, on the other the Financial Commission may be expected to report shortly and make us acquainted with the actual resources available for fundamental reforms which all acknowledge must be made, though opinions differ as to the precise direction they should take.

When we state that the Report to which we refer has been drawn up by a Commission, the Chairman of which —the Duke of Devonshire—is the Chancellor of Cambridge University, and that to it are appended the names of Stokes, H. J. S. Smith, Sharpey, Huxley, Lubbock, the Marquis of Lansdowne, and Mr. B. Samuelson as Commissioners, the importance of the document becomes manifest. Nor is it lessened by the way in which the Report at its outset refers to "all those parts of human knowledge and culture which are not usually regarded as having any scientific character;" adding, "Least of all should we wish to imply that there is any antagonism between the literary and scientific branches of education and research; it is rather our conviction that neither branch can be neglected without grave detriment to the other; and that an University in which the Mathematician, the Experimental Philosopher, and the Biologist are actively engaged in the endeavour to advance human knowledge in their own provinces, is not on that account less likely to be productive of original labours in the fields of Literature and Learning."

The subjects are dealt with in the following order:—

I. The Courses of Study and the Examinations.
II. The Professoriate.
III. The Scientific Institutions within the Universities.
IV. The Colleges.
V. The Relation of the Universities to Technical Education, and to Education for Scientific Professions.
VI. The Duty of the Universities and the Colleges with regard to the Advancement of Science.

Under the first head an examination on leaving school equivalent to the German *abiturienten examen*, to be controlled by the Universities, is proposed, "so that the scientific student who had shown the requisite literary proficiency in the 'Leaving Examination' would find himself absolutely free, except so far as the examination in Divinity is concerned, from the first moment of his entrance to the University, to devote his whole time and energy to his scientific studies." The Commissioners adding their opinion that "any system which does not concede, from the first, this freedom to those students of Science who have given proofs of sufficient literary acquirements, involves an interference with their course of study which in many cases is prejudicial."

The opinion is also expressed that; in addition to the College Scholarships, University Scholarships in Natural Science should be founded at both Universities; scholarships comparable to those which already exist for various branches of classical learning, and, at Oxford, of Mathematical Science.

Under the heading of the Professoriate, lists of the Professorial and Collegiate teachers at Oxford and Cambridge are given and compared with similar lists for Berlin, with the remark that "it is impossible not to be impressed with the evidence which the list affords of the abundance and variety of the scientific teaching given in the University of Berlin by professors of great eminence. We would particularly call attention to the fact that the list includes not merely general courses adapted to the requirements of those students who are interested in Science only as a part of a liberal education, but also special courses on subjects taken from some of the newest and most interesting fields of scientific inquiry; so that instruction of the kind most likely to develop a scientific spirit in the mind of the learner, and given by the most competent teachers, is put within the reach of every student."

With regard to the proposed additions to the Scientific Professoriate, without attempting to decide what should be the ultimate organisation of the Scientific Faculty in Oxford, the Commissioners are of opinion that arrangements should be made at the earliest possible opportunity for the establishment of two Professorships in Physics, and two in Chemistry, in addition to those already existing; for the redistribution of the biological subjects (exclusive of those assigned to the Faculty of Medicine) in such a manner as to secure their being represented by five independent professors; and for the addition of two chairs, one in Pure Mathematics and one in Mathematical Physics. Lastly, they are disposed to recommend the establishment of a Chair of Applied Mechanics and Engineering.

Somewhat similar additions are proposed in regard to Cambridge.

So far we have dealt with professors of the first order, so to speak, but the appointment of adjoint professors, demonstrators, and assistants is also proposed in the following words:—

"Although the witnesses have been unanimous as to the necessity of strengthening the professorial staff, they do not entirely agree as to the way in which this should be done. Mr. Pattison would increase the number of independent Chairs of Science to twenty or even to thirty. On the other hand, there appears to be a feeling that the principal subjects should not be too much divided although it is admitted that at present they are too much grouped together.

"It must not be forgotten that an increase in the number of independent Chairs would render it necessary for the Universities to provide increased accommodation in laboratories, and additional apparatus. With the view of utilising to the utmost the existing appliances of this sort, some of the witnesses have suggested that the increase of the professoriate should, as far as possible, be provided for by an abundant supply of skilled assistants, of demonstrators, and of assistant professors, rather than by increased numbers of independent lecturers.

"The necessity for skilled assistants and for demonstrators of course made itself felt at a very early period, and though a certain number of such assistants and demonstrators have been supplied, yet the need for an increase in the number of these subordinate offices has already become apparent. It may be mentioned, for example, that at neither University is any assistance of this kind at present afforded to the Chair of Geology, or to that of Botany.

"A Natural Science Professor should have, in the first place, sufficient skilled assistance to relieve him from all mere drudgery in the preparation of his lectures. In the second place, he should have such further assistance as may be necessary to enable him to carry on original researches. And, thirdly, although no professor would wish to hand over the superintendence of the practical teaching in his laboratories entirely to others, he should be enabled to discharge this duty of superintendence without an undue sacrifice of time. The work should be done under the professor's eye, but its details should be entrusted to competent demonstrators, appointed by and responsible to him.

"So far there is a general agreement; but the question whether assistant professors should be appointed at all, and if so, how far the dependence of the assistant professor upon the principal professor of the subject should be carried, has given rise to some divergence of opinion. We have already stated that we regard as indispensable the establishment of a certain number of new Chairs, to be independent of, and to take equal rank with, the existing Chairs. If the Universities are to become great schools of Science, it is of the first importance to secure for them the permanent services of a very considerable number of scientific men of established reputation; and we cannot perceive how this object is to be attained otherwise than by offering to such men, without any reservation whatever, the same academical *status* which has hitherto been enjoyed by the University Professors. We consider, therefore, that in any extension of the Professoriate, this is, without doubt, the first point to be attended to. But we are also disposed to attach great weight to the suggestion that, in addition to the Professorships representing the great divisions of Natural Science, University Teachers, who might be termed Adjoint Professors or Readers, should be appointed to undertake the instruction in special branches. It would be undesirable to place an Adjoint Professor in a position of complete subordination to the Principal Professor of the subject; and it would probably be very difficult to arrange any plan of partial subordination which could work satisfactorily. We are, therefore, of opinion that the Adjoint Professors should not be regarded as assistants to the Professors, but should be responsible for the due discharge of the duties assigned to them to a Board or Council, appointed by the University, and not to any individual Professor.

"It is important that the Universities should be able to secure the services of men who have shown their ability to promote Science, and to become successful teachers of it, by offering them places, such as the Adjoint Professorships, which would give them an opportunity of distinguishing themselves; and, with this view, it is very esirable that as much independence as possible should be allowed to the Adjoint Professors, in order to make the appointments attractive to the best men. On the other hand, as it is obvious that the perfection of the means and system of instruction in the Universities is of primary importance, an organisation of, and control over, the courses of instruction would be necessary, as otherwise there might be an excess of lectures in some subjects, and a deficiency in others. We are of opinion that these difficulties might be overcome, and a sufficient amount of liberty combined with systematic organisation, if, as we shall presently recommend, a Central Board, or Council, should be formed, representing the Scientific Faculty, and having definite functions with regard to the scientific teaching within the Universities.

"We may observe that the financial argument in favour of extending the Professoriate (at least in the first instance) by the institution of offices not intended to take equal rank with the existing Chairs, rather than by increasing the number of the Principal Professorships, will probably lose some of its force when a careful estimate is made of the difference which the adoption of the one plan or the other would make in the charge to be laid upon the funds of the Universities. It is quite true that the emoluments of an Adjoint Professor need not be so great as those of one of the Principal Professors; and that to this extent there would be a saving. But whether an additional professor of any subject be termed an Adjoint Professor, or whether his Chair be regarded as co-ordinate with the existing Chairs, the difficulty would always remain that if he is to be of any use at all he must be furnished with the necessary apparatus; he must have a room to lecture in, a room or rooms to work in, and the classification of the students will also probably require additional space. Laboratories of chemistry, physics, and physiology have been already provided; it would, therefore, not be necessary to create a large establishment for any new professor. But it is certain that the only way in which the Universities can increase the usefulness, at the same time that they increase the number, of the professors, is by being ready to make, from time to time, such moderate additions as may be necessary to the buildings which they appropriate to Science."

Under the heading "Duties of Professors," we have the following:—

"It has been suggested that, in the case of certain professorships at both Universities, the functions of Original Research might be separated from direct instruction. To a professor the duty of teaching is a matter of daily routine; whereas, original research is a duty which belongs to no day in particular, and which is, therefore, very likely to be neglected in comparison with the other. Nevertheless, we cannot see any just and sufficient reason, in the case of the professorships, for a total separation of the two functions; and even Sir Benjamin Brodie, who has supported the view that some distinction should be made between offices appropriated to teaching and those appropriated to original research, would not have the separation absolute, and would consider it of importance that even a professor whose chair was founded chiefly with the latter view, should be called upon to produce, from time to time, in the form of lectures, the results of investigations in new departments of Science. Lecturing is not the only mode in which scientific instruction may be imparted. A professor who should undertake the direction of a laboratory in which advanced students were to be trained in the methods of scientific research, would be very far from holding a sinecure office, and would be rendering the highest, as well as the most direct, service to scientific education.

"We have no doubt that for a professor the duty of teaching is indispensable, but we agree with the witnesses whom we have examined that original research is a no less important part of his functions. The object of an university is to promote and to maintain learning and science, and scientific teaching of the highest kind can only be successfully carried on by persons who are themselves engaged in original research. If once a teacher ceases to be a learner it is difficult for him to maintain any freshness of interest in the subject which he has to teach; and nothing is so likely to awaken the love of scientific inquiry in the mind of the student as the example of a teacher who shows his value for knowledge by making the advancement of it the principal business of his life.

"It has been, to a certain extent, a complaint against the School of Natural Science in Oxford that hitherto it has produced but very few original workers. The complaint (if well founded) may, perhaps, be accounted for by the circumstance that the school has not been long in existence; but there can be no question that it is of the utmost importance to impress upon teachers and learners alike that one, and perhaps the chief criterion of success in the teaching of Science is its leading to new discoveries. To promote this end the Universities probably can do nothing more useful than to increase the number of persons employed, under whatever name, in the teaching of Science, taking care at the same time that while such duties are assigned to them as may prevent their offices from being sinecures, they shall be left with time and energy enough to carry on original work. We consider this to be a point of great importance, and we should regret to see any scientific office whatever established in either of the Universities without its being understood that it is expected from the holder that he shall do what is within his power, not only for the diffusion, but also for the increase of scientific knowledge.

"It has been stated in some parts of the evidence which we have taken, that the duties of lecturing and teaching which are required from the professors are such as seriously to interfere with their leisure for original investigation, and a wish has therefore been expressed that the provisions of the Professorial Statutes as to the number of lectures to be given should be relaxed. We cannot concur with this suggestion. In estimating the amount of teaching and lecturing which can properly be required from a professor, we do not forget that he is expected to keep himself well acquainted with all the latest advances in some very wide department of knowledge, a task which, at the present rate of scientific productiveness, is no light one. But, on the other hand, we cannot leave out of sight that the University duties of a professor last for only six months, and that he has thus the invaluable privilege of being master of his own time for fully one half of the year. It is, therefore, only reasonable that during the University Terms he should devote a fair proportion of his time to the work of teaching. And we feel it to be our duty to say that, in recommending, as we have done, the foundation of a considerable number of new Scientific Professorships, our intention is that duties of a very substantial kind should be attached to each of these offices, with a view to the establishment of an efficient and complete course of instruction."

From the limited scope of the functions of the various existing administrative bodies, as well as from the constitution of one of them, the Commissioners consider that they cannot be regarded as representing, in any adequate manner, the Scientific Faculty of the University. They then add, "We are of opinion that the best mode of providing for this important object would be to replace them by a Single Administrative Body, representing every department of Science, and having wider but still definite powers entrusted to it. Without attaching any importance to the name, we shall, for the purposes of the present Report, designate this proposed administrative body as the University Council of Science.'

"The duties of the Council would, we conceive, be twofold—educational and financial."

(*To be continued.*)

HARMONIC ECHOES

ACCORDING to Dr. Brewer[*] "The harmonic echo repeats in a different tone or key the direct sound. The harmonic is generally either the third, fifth, or tenth of the tonic. . . . On the river Nahe, near Bergen, and not far from Coblentz, is an echo thus described by Barthius:—It makes seventeen repetitions at unequal intervals. Sometimes the echo seems to approach the listener, sometimes to be retreating from him; sometimes it is very distinct, at others extremely feeble; at one time it is heard at the right, and the next at the left; now in unison with the direct sound, and presently a third, fifth, or tenth of the fundamental. Occasionally it seems to combine two or more voices in harmony, but more frequently it resembles the voice of a single mimic.

"At Paisley, in Scotland, there is a somewhat similar echo in the burying-place of Lord Paisley, Marquis of Abercorn. Musical notes rise softly, swell till the several echoes have reverberated the sound either in unison or harmony, and then die away in gentle cadence.

"At the Lake of Killarney, in Ireland, is a very celebrated harmonic echo, which renders an excellent *second* to any simple air played on a bugle.[†]

"There was formerly, according to the authority of Dr. Birch, an harmonic echo no less remarkable, seventeen miles above Glasgow, near a mansion called Rosneath. If a trumpeter played eight or ten notes, the echo would repeat them correctly a third lower. After a short silence another repetition was heard, still lower than the former; and after a similar pause the same notes were repeated a third time, in a lower key and feebler tone, but nevertheless, with the same undeviating fidelity. This echo no longer exists."

It is difficult to believe that these descriptions are accurate, but that they have a basis of truth there can be little doubt. My attention was first drawn to the subject

[*] "Brewer on Sound and its Phenomena." (1864.) P. 305.

[†] This must be a near connection of the equally celebrated Irish echo, which in reply to "How do you do?" answers, "Very well, thank you."—R. Or of that celebrated echo at Shoreditch Station, illustrated by poor Leech in *Punch*, where, to the old gentleman's call of "Porter," is replied "Don't you wish you may get him."—ED.